

Abstract Of The Disclosure

A graphics system including a custom graphics and audio processor produces exciting 2D and 3D graphics and surround sound. The system includes a graphics and audio processor including a 3D graphics pipeline and an audio digital signal processor. A memory controller performs a wide range of memory control related functions including arbitrating between various competing resources seeking access to main memory, handling memory latency and bandwidth requirements of the resources requesting memory access, buffering writes to reduce bus turn around, refreshing main memory, and protecting main memory using programmable registers. The memory controller minimizes memory read/write switching using a "global" write queue which queues write requests from various diverse competing resources. In this fashion, multiple competing resources for memory writes are combined into one resource from which write requests are obtained. Memory coherency issues are addressed both within a single resource that has both read and write capabilities and among different resources by efficiently flushing write buffers associated with a resource.